

REMARKS

Claims 1-12 and 15-17 are pending in the application. Claims 1, 10 and 12 have been amended. Reconsideration of the rejection and allowance of the pending application in view of the following remarks are respectfully requested.

In the Office Action, the Examiner rejected claims 1, 15 and 17 under 35 U.S.C. §102(e) as being anticipated by Maruyama (U.S. Patent No. 6,346,957). Applicants respectfully traverse the rejection for at least the following reasons.

The present invention is directed towards a multi-beam scanning device. The device includes, inter alia, a light source that emits a plurality of light beams, a polygonal mirror that deflects the light beams emitted by the light source to scan an object, and an optical system that converges the deflected light beams on a plurality of objects to be scanned. The optical system includes a plurality of optical path turning systems that turn optical paths of the deflected light beams. Each of the optical path turning systems includes a first reflective surface. See, for example, Figure 2 and elements 701, 703, 705, and 707.

The first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system. Each of the first reflective surfaces is positioned along a direction in which the light beams are deflected by the polygonal mirror. The optical path lengths of the optical paths are substantially the same, and all of the optical path turning systems include an even number of reflection surfaces.

Maruyama is directed to an optical scanning device. Maruyama's optical scanning device includes a polygon mirror 29 that commonly deflects four light beams from a mirror 28, and a f θ lens 30 for focusing the light beams deflected by the polygon

mirror 29. The optical scanning device also includes a separating polygon mirror 31 that separates the four light beams passed through the f θ lens 30, and beam corresponding optical systems 22a, 22b, 22c, 22d for guiding the four light beams separated by the separating polygon mirror 31 to scanned surfaces 23a, 23b, 23c, and 23d of photoreceptor drums. See Figure 1 and col. 6, lines 32-55.

Applicants respectfully submit that the beam corresponding optical systems 22a, -22d are not positioned along a direction in which the light beams are deflected by the polygon mirror 29. Rather, the light beams must first be deflected by the separating polygon mirror 31 into a new path in order to reach the beam corresponding optical systems 22a-22d. See Figure 1. The embodiments illustrated in Figures 11, 12, 14A-14C, 18A, 18B illustrate similar arrangements.

Applicants also submit that Maruyama does not disclose a plurality of reflective surfaces positioned along a direction in which the light beams are deflected by the polygonal mirror. Maruyama discloses that the light beams deflected by the polygon mirror 29 are reflected by a single common separating mirror 31 provided in the path of the light beams before being incident onto the beam corresponding optical systems 22a-22d. See Figures 1, 11, 12, 14A-14C, 18A, 18B.

Thus, Applicants respectfully submit that Maruyama fails to disclose (or even suggest) a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, and each of the first reflective surfaces is positioned along a direction in which the light beams are deflected

by the polygonal mirror, as recited in independent claim 1. For at least these reasons, Applicants respectfully submit that the 35 U.S.C. § 102(e) rejection of independent claim 1 is improper, and respectfully request withdrawal of the rejection.

Dependent claims 15 and 17 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

In the Office Action, the Examiner rejected claims 2-9 under 35 U.S.C. § 103(a) as being unpatentable over Maruyama in view of Tanaka et al. (U.S. Patent No. 6,473,105). Applicants respectfully traverse the rejection for at least the following reasons.

Tanaka is directed to an optical scanning apparatus. Tanaka discloses that a plurality of reflection mirrors 26 are disposed on optical paths of laser beams extending from a deflector 220 to drums 21-24. See Figure 2 and col. 4, lines 61-65. However, as seen in Figures 1-5, not all of the optical paths include an even number of reflection mirrors, in contrast with Applicants' claimed invention.

Further, Applicants respectfully submit that there is no motivation to combine Maruyama and Tanaka, as asserted by the Examiner, as the arrangements of the mirrors in the two inventions are completely different.

Thus, Applicants respectfully submit that the combination of Maruyama and Tanaka fails to suggest a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, each of the first reflective surfaces is positioned along a direction in which the light beams are

deflected by the polygonal mirror, and all of the optical path turning systems include an even number of reflection surfaces, as recited in independent claim 1. For at least these reasons, Applicants submit that the combination of Maruyama and Tanaka does not suggest the invention recited in independent claim 1.

Dependent claims 2-9 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

In the Office Action, the Examiner rejected claims 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Maruyama in view of Tanaka et al., and further in view of Kamikubo (U.S. Patent No. 6,115,164). Applicants respectfully traverse the rejection for at least the following reasons.

Kamikubo is directed to a scanning optical system. Applicants respectfully submit that Kamikubo fails to disclose or suggest an optical system that includes a plurality of optical path turning systems that turn optical paths of deflected light beams, and thus submit that Kamikubo fails to disclose or suggest the deficiencies of Maruyama and Tanaka.

Thus, Applicants respectfully submit that the combination of Maruyama, Tanaka and Kamikubo also fails to suggest a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, each of the first reflective surfaces is positioned along a direction in which the light beams are deflected by the polygonal mirror, and all of the optical path turning systems include an even number of reflection surfaces, as recited in independent claim 1. For at

least these reasons, Applicants submit that the combination of Maruyama, Tanaka and Kamikubo does not suggest the invention recited in independent claim 1.

Dependent claims 10-12 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

In the Office Action, the Examiner also rejected claims 2, 3 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Maruyama in view of Koide (U.S. Patent No. 5,181,137). Applicants respectfully traverse the rejection for at least the following reasons.

Koide is directed to a light scanning apparatus. The light scanning apparatus includes mirrors 130-133, 130a-133a and 130b-133b which reflect four laser beams from a first focusing lens system 3. One of the laser beams is deflected by a group of mirrors consisting of mirrors 130, 130a, 130b, another is deflected by a group consisting of mirrors 131, 131a, and 131b, another is deflected by a group consisting of mirrors 132, 132a, and 132b, and another is deflected by a group consisting of mirrors 133, 133a and 133b. See Figure 4 and col. 4, lines 3-16. Thus, each of Koide's laser beam is reflected by a group of three mirrors. In contrast, the optical path turning systems of the present invention include an even number of reflection surfaces.

Further, Applicants respectfully submit that there is no motivation to combine Maruyama and Koide, as asserted by the Examiner, as the arrangements of the mirrors in the two inventions are completely different.

Thus, Applicants respectfully submit that the combination of Maruyama and Koide, asserted by the Examiner, fails to disclose or suggest a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path

turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, each of the first reflective surfaces is positioned along a direction in which the light beams are deflected by the polygonal mirror, and all of the optical path turning systems include an even number of reflection surfaces, as recited in independent claim 1. For at least these reasons, Applicants submit that the combination of Maruyama and Koide does not suggest the invention recited in independent claim 1.

Dependent claims 2, 3 and 16 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

In the Office Action, the Examiner also rejected claims 4-8 under 35 U.S.C. § 103(a) as being unpatentable over Maruyama in view of Koide, and further in view of Wang (U.S. Patent No. 6,219,168). Applicants respectfully traverse the rejection for at least the following reasons.

Wang relates to a raster output scanning system 330. The scanning system 330 includes a rotating polygon mirror 300 which reflects a first modulated beam 320 to a first fold mirror 336, where it is reflected to a wobble correction mirror 338, reflects a second modulated beam 322 to a second fold mirror 342, where it is reflected to a wobble correction mirror 344, reflects a third modulated beam 324 to a third fold mirror 348, where it is reflected to a wobble correction mirror 350, and reflects a fourth modulated beam 326 to a fourth fold mirror 354, where it is reflected to a wobble correction mirror 356. However, Applicants submit that it clear from Figure 7 that the optical path lengths of each of Wang's modulated beams 320, 322, 324 and 326 are not substantially the same, in contrast to Applicants' claimed invention.

Further, Applicants respectfully submit that there is no motivation to combine Maruyama, Koide and Wang, as asserted by the Examiner, as the arrangements of the mirrors in the three inventions are completely different.

Thus, Applicants respectfully submit that the combination of Maruayama, Koide and Wang, asserted by the Examiner, fails to disclose or suggest a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, each of the first reflective surfaces is positioned along a direction in which the light beams are deflected by the polygonal mirror, and all of the optical path turning systems include an even number of reflection surfaces, as recited in independent claim 1. For at least these reasons, Applicants submit that the combination of Maruyama, Koide and Wang does not suggest the invention recited in independent claim 1.

Dependent claims 4-8 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

In the Office Action, the Examiner also rejected claims 9-12 under 35 U.S.C. § 103(a) as being unpatentable over Maruyama in view of Koide and Wang, and further in view of Kamikubo. Applicants respectfully traverse the rejection for at least the following reasons.

As noted above, Kamikubo fails to disclose or suggest an optical system that includes a plurality of optical path turning systems that turn optical paths of deflected light beams.

Thus, Applicants respectfully submit that the combination of Maruayama, Koide, Wang and Kamikubo, asserted by the Examiner, also fails to disclose or suggest a multi-beam scanning device that includes an optical system including a plurality of optical path turning systems that turn optical parts of deflected light beams, where each of the optical path turning systems includes a first reflective surface, the first reflective surface of each of the optical path turning systems is separate from the first reflective surface of every other optical path turning system, each of the first reflective surfaces is positioned along a direction in which the light beams are deflected by the polygonal mirror, and all of the optical path turning systems include an even number of reflection surfaces, as recited in independent claim 1. For at least these reasons, Applicants submit that the combination of Maruyama, Koide, Wang and Kamikubo does not suggest the invention recited in independent claim 1.

Dependent claims 9-12 are also submitted to be in condition for allowance for at least the reasons set forth above with respect to independent claim 1.

Based on the above, it is respectfully submitted that this application is now in condition for allowance, and a Notice of Allowance is respectfully requested.

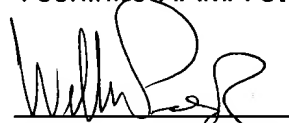
SUMMARY AND CONCLUSION

Entry and consideration of the present amendment, reconsideration of the outstanding Office Action, and allowance of the present application and all of the claims therein are respectfully requested and now believed to be appropriate. Applicants have made a sincere effort to place the present invention in condition for allowance and believe that they have now done so.

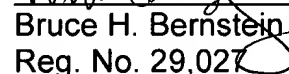
Any amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Should the Examiner have any questions or comments regarding this response, or the present application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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